Estimating Consumer Willingness-to-Pay for Country-of-Origin Labels for Beef Products

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Introduction

The escalating demand for high quality food, and improved food safety standards has created a growing market for value-added products that carry a strong identification with a particular geographical region or country. Moreover, the recent food safety scares in Europe and Japan have added to the demand for origin-specific foods. In addition to consumers' food safety concerns, the beef industry has recently undertaken considerable efforts to improve the quality of beef that is produced in the U.S. Both producer and consumer groups have considered country-of-origin labeling of beef products sold in the U.S. to be an alternative that would enable consumers to choose U.S. produced beef (Brester and Smith, 2000).

Currently, the Tariff Act of 1930 requires labels indicating the country-of-origin on all fresh and frozen beef products imported into the U.S. However, under the existing system, the label does not need to accompany the product after it has been repackaged (Becker, 1999). Therefore, beef handlers are not required to specify to their subsequent buyers whether the beef (fresh or frozen) is a U.S. produced or an imported product. The implementation of a more stringent, mandatory country-of-origin labeling system for all meat products sold in the U.S. has been debated for several years by agricultural producers, meat industry organizations and consumer advocate groups (USDA-FSIS).

A number of arguments exist both in favor and against country-of-origin labeling of fresh and frozen beef products. According to Becker (1999) arguments in favor include the idea that country-of-origin labeling would give U.S. producers the opportunity to create a competitive niche market, as long as consumers select American beef over imported beef. As in the

genetically modified debate, labeling advocates believe consumers have "the right-to-know" where their meat products originate. For example, a national survey sponsored by the National Cattleman's Beef Association (NCBA), found that 78% of the 1,000 American consumers polled support country-of-origin labeling (Supermarket News, 1999). Finally, proponents of a mandatory labeling policy argue that the costs associated with this labeling policy, as Becker (2001) pointed out, are minimal.

On the other hand, arguments against country-of origin labeling include the concern that a label is an unnecessary trade barrier. Some trade officials are concerned that other countries would retaliate against this trade policy if the U.S. implements it, and that U.S. meat exports could suffer an intense reduction. Other opponents of labeling believe that the country-of-origin labeling program would be difficult to implement, since many meat products are made by combining beef originating from various sources. A 2000 U.S. Congressional study determined that the potential costs associated with implementation of a country-of-origin labeling system would outweigh the potential benefits, due to the fact that approximately 15% of the beef sold in the United States is imported (USDA-FSIS). Therefore, industry compliance costs could be too high, and optimally, the consumer may be bearing these additional costs. Finally, labeling adversaries argue that many consumers may develop a taste for international, imported beef (as it happened with Japanese cars in the 1980's), resulting in a reduction of the U.S. beef market share.

Regardless of the debate surrounding country-of-origin labeling, the proposed Farm Security and Rural Investment Act of 2002 (2002 Farm Bill) includes a program mandating the U.S. Secretary of Agriculture to provide guidelines for voluntary labeling of meat, fruits and vegetables, fish and peanuts by September 30, 2002. Furthermore, the proposed 2002 Farm Bill

requires this voluntary program to become mandatory by 2004. The bill states, "…for a commodity to be labeled a USA product, it must be born, raised and processed in the U.S. (Farm Bill Conference Framework, 2002)."

While the new Farm Bill mandates country-of-origin labels on all perishable products, very little research has been conducted to assess the economic impact of country-of-origin labels. For example, could a premium based on country-of-origin attributes offset the costs associated with such a labeling policy? In addition, what market segment is willing to pay a premium for U.S. labeled beef; and what market segment is willing to support international beef products? What role do the socio-demographic characteristics play on this market segmentation? If a premium exists for U.S. beef, what factors affect such premium? Do American consumers consider domestic beef to be safer than imported beef?

Given these currently unanswered questions surrounding country-of-origin labeling for beef and other perishable products, the objectives of this paper are twofold: (1) to determine consumers' preferences and the economic effect of country-of-origin labels on beef demand, and (2) to calculate the market premium (if it exists) for U.S. labeled beef versus non-labeled or imported beef. Testable hypotheses include: segments of U.S. consumers are willing to pay a premium for U.S. labeled, domestically produced beef; the percent premium for U.S. labeled beef will differ among beef products; the market segment of consumers who are willing to pay a premium for the U.S. labeled steaks will differ from the segment of consumers who are willing to pay a premium for U.S. labeled ground beef or hamburger. The research presented in this paper will shed light on consumers' responses toward country-of-origin-labeling in beef products.

Previous Studies

Interest in food labeling has been increasing recently due to consumer food safety concerns, and because of the emergence of eco-labels and various food labels identifying food as organic, natural and "not genetically modified." Many researchers have studied behavioral changes that take place in response to food labeling. Examples include: Blend and Van Ravenswaay (1999), and Wessells, Johnston and Donath (1999). These studies find that a change in labeling or information can change consumers' perceptions and behavior. While these studies all examine the effect of food labels on consumers, to date not many studies have been published in the area of consumer economics and demand analysis dealing with country-of-origin labels.

Previous marketing research has examined the effect of country-of origin labels on consumers' behavior toward non-food products. Erickson *et al.* (1984) conducted research to determine whether the country-of-origin affected consumers' beliefs with respect to the evaluation of cars. Their results suggest that the image variable does affect belief formation rather than attitude. Howard (1989) investigated the foreign product image of American consumers to determine how these "made in" stereotypes were formed. He concluded that the consumer's attitudes about the quality of the automobile produced by a particular country produced a "halo effect" that covered all products from that country.

Wall, Liefeld and Heslop (1991) tested empirically in a multi-product, multi-cue setting the importance of the country-of-origin cue on consumer judgments. In their experiment they concluded that consumers used external information cues about the product. In many cases, consumers favored a low-priced, well-known brand, from a high reputation country, although this did not hold true for all products and scenarios. Strutton and Pelton (1993) look at a sample

made of Southeast Asian consumers and their perceptions regarding American and Japanese Imports. Using discriminate analysis, they found that consumers perceived differently U.S. and Japanese imports. In an international context, a factor to consider when evaluating country-of-origin labels is the image of the country itself. Phelps (1972) and Arrow (1973) studied principles of this type of lemons problem in the labor market. Under their theory of discrimination, employers assign *a priori* a lower subjective probability of the satisfactory productivity to minority workers compared with white workers. In the same way, the "country-of origin-effects" has significant implications for international trade and consumer's perception of quality products. Chiang and Masson (1988) observed that consumers often "statistically discriminate" against imports from developing countries. Haucap *et al.* (1997) explained that location choice could act as a signal for product quality, in the sense that high country specific costs (minimum wages, environmental taxes, lay-off plans, and others) signal high product quality.

While the studies discussed above examine consumers behavior toward country-of-origin labels, few studies have examined consumers' perceptions associated with country-of-origin labels on beef products. Schupp and Gillespie (2001a) sampled beef processors, retailers and restaurants in Louisiana to identify why these beef-handling firms would either support or reject a mandatory country-of-origin labeling policy. They found that supporters of a law felt that their consumers would find the label valuable, while opponents of the law thought that mandatory labeling simply meant more government intervention. In another study by Schupp and Gillespie (2001b), Louisiana households were surveyed to find consumers' degree of support for mandatory country-of-origin labeling of beef in grocery stores and restaurants. Over eighty-percent of their respondents supported a compulsory labeling program. While these studies show

beef handlers' and consumers' support of mandatory labeling, they do not shed light on whether or not consumers would be willing to pay the additional costs associated with the mandatory labeling policy.

A willingness-to-pay study by Quagrainie, Unterschultz and Veeman (1998) compared a popular beef product from Alberta with a similar product produced elsewhere in Canada. They found that the price of the non-Alberta meat product had to be reduced by 15 percent so that consumers would be indifferent between the two sources. Loureiro and McCluskey (2000) found that Spanish consumers were willing to pay a premium for fresh meat products labeled with a Protected Geographical Identification label (PGI), "Galician Veal," which is regulated by the European Union. While consumers were willing to pay a premium for the beef with a "Galician Veal" label, the premium varied depending upon the cut and quality of beef. Thus, a high-quality steak did not carry the same premium as stew meat. In an additional willingness-to-pay study, Umberger et al. (2002) found that in blind taste tests, consumers could taste and were willing to pay a significant premium of $0.70 per pound (on average) for corn-fed beef raised in the U.S. versus grass-fed beef raised in, and imported from Argentina. However, a small niche market (23%) of the consumers preferred and were willing-to-pay a $1.36 per pound premium for the Argentine, grass-fed beef. While these studies indicate that consumers are willing-to-pay a premium for geographically labeled products, they are likely not representative of U.S. consumers' preferences and supermarket choices. This current research will resolve questions regarding U.S. consumers' preferences and willingness-to-pay for country-of-origin labeling of beef.

Theoretical Background

The consumer's decision process is modeled using a random utility approach. We assume that consumer utility, $U(y,x,m)$, has three arguments: whether the beef product has a label, *y*, other product attributes and consumer characteristics that may affect consumer choice, *x*, and the income level, *m*. The variable *y* is an indicator variable, which equals one if the product carries a label, and zero otherwise. The consumer is willing to pay *c* dollars to switch to a labeled product, which will make his/her utility at least as great as it would be without a label. Mathematically, *c* is represented as

$$U(0,x_0,m) \le U(1,x_1,m-c). \tag{1}$$

The consumer's utility function is unknown because some components are unobservable to the researchers, and thus, can be considered random variables from the researcher's standpoint. Since utility is unobservable, we decompose utility into an unobservable part and an error term, ε_i. Mathematically, $U(y,x_i,m) = V(y,x_i,m) + \varepsilon_i$. We assume that the random variable error term ε_i is independent and identically distributed with a mean of zero. The consumer's decision to pay *c* dollars can be represented as:

$$V(0,x_0,m) + \varepsilon_0 \le V(1,x_1,m-c) + \varepsilon_1, \tag{2}$$

The decision to pay *c* can be expressed in a probability framework as

$$\Pr\{WTP \ge c\} = \Pr\{V_0 + \varepsilon_0 \le V_1 + \varepsilon_1\} = \Pr\{\varepsilon_0 - \varepsilon_1 \le V_1 - V_0\}. \tag{3}$$

This theoretical model lays the groundwork for the specific empirical models that we estimate in order to analyze the factors affecting choice and WTP for mandatory country-of-origin labels. In the current study, a binary choice model has been used to model the decision of supporting mandatory country-of-origin labeling.

Methods

In assessing the desire for mandatory labeling programs and consumers' willingness to pay for "U.S. Certified Steak," and "U.S. Certified Hamburger," respondents provided "Yes" "No" answers to the valuation questions at hand. To analyze these dichotomous choices, we used independent logit models based on the following logistic probability function:

$$(4) \qquad P_i = F(WTP_i) = \frac{1}{1+e^{-WTP_i}} = \frac{1}{1+e^{-(\alpha+\mathbf{X}_i\beta)}},$$

where P_i is the probability that the ith consumer will make a certain choice (answer = "Yes"), given the observed level of certain socio-demographic characteristics, food safety attitudes and information conditions contained in $\mathbf{X_i}$. Therefore, if (1) represents the probability that a consumer will answer "Yes" to the question regarding mandatory country-of-origin labeling, then 1-P_i will be the probability associated with answering "No."

Thus,

$$(5) \qquad 1 - P_i = \frac{1}{1+e^{WTP_i}}$$

As a consequence, if we want to estimate the odds ratio in favor of saying "Yes," versus saying "No," then we need to calculate the ratio of both probabilities.

$$\frac{P_i}{1-P_i} = \frac{1+e^{WTP_i}}{1+e^{-WTP_i}} = e^{WTP_i} = e^{\alpha + x_i \beta_i} \tag{6}$$

When linearizing (3) by taking the natural log, we obtain the odds ratio in favor of those respondents answering "Yes" to any specific question given $\mathbf{X_i}$, where $\mathbf{X}_i$ is a $(n \times K)$ matrix of subjective consumer preferences when buying beef, subjective information, and socio-demographic characteristics. This can be shown as:

$$Log\left(\frac{P_i}{1-P_i}\right) = WTP_i = \alpha + \mathbf{X_i}.\beta, \tag{7}$$

where Y_i is the dichotomous response $(n \times 1)$ vector related to a $(n \times K)$ matrix of observable explanatory variables $\mathbf{X}_i$. Notice that the meaning of the coefficients cannot be interpreted as the direct effects on the probability of supporting mandatory labeling; rather, they measure the change in the odds ratio by a change in a unit of X. In order to estimate the effects on the probabilities directly, as Maddala (1998) explains, we need to estimate the marginal effects.

It's convenient to remember that the underlying statistical model is based on a latent and continuous unobservable (Y_i^*) variable unknown to the researcher, which in the context of the labeling analysis could be the general consumers' concerns about source verification issues. The

observable variable, which is modeled by the researcher, is the response to the dichotomous choice. Thus, the latent model is represented by:

(8) $$WTP_i = I_{(0,\infty)}(WTP_i^*), \qquad \text{where} \quad WTP_i^* = \alpha + \mathbf{X_i}.\beta + \varepsilon_i.$$

Therefore,

(9) $$WTP_i = \begin{Bmatrix} 1 \\ 0 \end{Bmatrix} \quad \text{iff} \quad \text{WTP}_i^* = \alpha + \mathbf{X_i}.\beta + \varepsilon_i \begin{Bmatrix} > \\ \leq \end{Bmatrix} 0.$$

Notice that we are assuming that the ε_i are *iid* unobservable random variables, which follow a logistic distribution with mean 0 and a variance of $\pi^2/3$.

We observed a "Yes" response if and only if the latent unobservable variable is greater than 0. On the other hand, we observed a "No" response when the latent variable (consumers' concerns) is less than or equal to 0.

Data

The survey was pre-tested with focus groups in early March 2002 and conducted in late Spring 2002 in grocery stores located in different towns of Colorado, such as: Denver, Fort Collins, and Boulder**.** Customers entering the grocery stores were selected randomly; the interviewers solicited every third customer who came into the store. In order to collect a more representative sample, including multiple segments of the shopping population, this survey was conducted in different grocery food chains and during both weekends and weekdays. In total,

eight different stores participated in this study. In order to increase consumer participation interviewers were instructed to wear University t-shirts.

In contrast to studies that use mostly telephone or mail survey data, our survey data was collected in grocery stores. By collecting data from consumers at the same time and place where actual purchase decisions are made, we attempted to obtain data directly from the actual decision-makers and to better elicit consumers' true preferences about beef products. In total, 243 consumers were surveyed. The majority of respondents were the primary food shoppers of the household (89%), Caucasian (88%) and female (64%). The respondents' average age was about 40 years, and 39% of all respondents had children under the age of 18 years old living in their household. The mean income of the sample was calculated about $40,000 for the 2001 calendar year, and their average education included a junior college degree. Summary statistics and variable descriptions are presented in Table 1. Our sample is comparable to the Colorado Statistics (U.S. Census 2000) in terms of education, number of children per household, and household size. However, this sample includes fewer minorities and a higher percentage of female respondents.

As with all surveys, the ability of the sample to represent the population is a concern, and the effect of population choice on our results concerning willingness-to-pay for country-of-origin labels is likely indeterminate. There may also be some degree of sample selection bias, in which the people who were more interested in source assurance labels, or more willing to support University students elected to participate in the survey. Given the potential sources of bias, we caution that our findings may not represent those of other populations.

The survey solicited information regarding respondents' purchasing behavior and attitudes about beef products, beef qualities that consumers find most desirable, food safety

attitudes, whether or not they would be willing to pay a certain amount a year in taxes to support a mandatory country-of-origin labeling program, and whether they would pay a given premium for steak and hamburger labeled as "Certified U.S. beef." Finally, socio-demographic characteristics were elicited in the last part of the survey.

Regarding beef attributes important to consumers, as Table 2 shows the importance of freshness, the importance of beef being inspected, and the importance of carrying a high quality grade are the three attributes that rank the highest in a Likerd Scale. Surprisingly, local attributes or the importance that the beef was raised locally ranks as one of the least important attributes. Additionally, in our sample (See Table 3), 23 percent of the consumers recognize that price is the main driving force of their shopping decisions, while for 41 percent of the consumers, the driving force is quality, and for the rest of the sample (25 percent) is health and food safety issues. Thus, overall our sample has a majority of consumers who are quality and food safety seekers.

Following the NOAA 1993 panel recommendations (Arrow et al., 1993), a dichotomous referendum question has been used to elicit the WTP for the mandatory country-of-origin labeling program, as well as the individual premiums for steaks and hamburgers labeled as "Certified U.S. Beef." In particular, consumer faced the following valuation questions:

"Suppose that you could vote in a referendum regarding "country-of-origin" labeling. If implementation of this mandatory country-of-origin labeling program for beef would cost your household $[bid]/year. What would your position be with respect to this mandatory labeling program?

a. In favor of a mandatory program

b. Against a mandatory labeling program.

In this question the random bids assigned to consumers ranked from $10/year up to $250/year. Independently of whether or not the customer was willing to pay the assigned amount for the mandatory labeling program, the next questions elicited consumer WTP for steak and hamburger labeled as "Certified U.S. Beef." The interviewer read: *Now, assume that the costs of traceability required to label a steak as "Certified U. S. Beef" is $[bid]/lb of steak in addition to the traditional $4.00/lb price, would you be willing to pay this premium to guarantee that your beef is "Certified U.S. Beef"?*

a. Yes

b. No

A similar question was presented to the customer to elicit WTP for a "Certified U.S. Beef Hamburger;" however, the regular or traditional price was set at $1.20/lb of hamburger. In both cases, the bid amounts were percent values in increments of 5% over the initial the value of the product, adding up to a maximum premium of 75%.

Variable definitions and summary statistics for the questions related to consumers' food safety attitudes and driving forces when buying meat products are presented in Table 2.

Empirical Specification

In order to simplify the comparison of the results among models, a set of common explanatory variables has been used to explain the three independent decisions. The following logit model was estimated in order to empirically model the consumer's desire for mandatory country-of-origin labeling of beef products, as well as their willingness to pay a premium for "Certified U.S. Steak," and "Certified U.S. Hamburger":

(7)

$$WTP_i^* = \beta_0 + \beta_1 Bid_i + \beta_2 Shopper_i + \beta_3 Female_i + \beta_4 Kids_i + \beta_5 Educat_i * Income_i + \beta_6 FoodSafety + \beta_7 Quality_i + \beta_8 SourceAssurance_i + \varepsilon_{i,}$$

where Bid_i represents the random amount that the consumer was asked to pay; $Shopper_i$ is a binary variable that represents whether the respondent is the main shopper; $Female_i$ denotes whether the respondent is a female; $kids_i$ denotes whether there are children living in the household; $Educat_i$*$Income_i$ is the cross-product of consumer's individual education and income levels; $FoodSafety_i$ represents the respondent's subjective importance of food safety; $Quality_i$ measures the importance of quality; $SourceAssurance_i$ denotes the subjective importance of source verification labels in meat products; and finally ε_i is the error term that follows a logistic distribution.

Results

The coefficients for the willingness-to-pay equations used to model the consumer's desire to pay a) for a mandatory country-of-origin labeling program; b) a premium for "Certified U.S. Steak;" and c) a premium for "Certified U.S. Hamburger" are presented in Table 4. All coefficients carry the expected sign, except the cross-product of education and income. We expected that consumers with higher education and income would be more willing to support a mandatory country-of-origin labeling program, and would be more likely to pay a premium for "Certified U.S" meat products. Obtaining the opposite result may suggest that wealthier and more educated consumers already consider the meat supply safe, and do not place much value on labeling of origin.

As expected, the bid or randomly assigned amount (price for the program or the good) carries a negative sign. As demand theory predicts, the higher the premium or amount requested to pay, the lower the probability that a consumer would be willing to pay such a premium. Other socio-demographic variables behave as expected. Thus, the fact that the respondent is the main shopper of the household increases the probability that he/she will be willing to pay a premium for the three different labeling programs. Additionally, if the respondent is a female, the probability of the respondent to be willing to pay for a mandatory country-of-origin labeling program, as well as a premium for "U.S. Certified Hamburger" increases and is statistically significant. The presence of children in the household is the only socio-economic factor statistically significant when modeling the WTP equation for "U.S. Certified Steak."

With regard to the variables denoting the importance of quality, food safety, and quality assurance to respondents, we find that consumers who are concerned about food quality and food safety are more likely to pay for a general mandatory labeling program, and to pay a premium for the "U.S. Certified Steak." On the other hand, consumers who are more concerned about source assurance of their food are more likely to pay a premium for "U.S. Certified Hamburger." This finding reflects the fact that hamburger eaters may be more concerned about country-of-origin certification given that a mixture of meats are commonly used to produce hamburgers.

Willingness-to-Pay Estimates

Willingness-to-pay estimates were obtained using the "grand constant" formulae (Giraud, Loomis, Johnson, 1999), which is calculated by multiplying the coefficients by their respective variable mean, then summing over all coefficients (excluding the bid) and dividing by the bid term. Thus,

$$(8)\quad Mean\hat{WTP} = \frac{\hat{\beta}_0 + \sum_{j=2}^{8}(\hat{\beta}_j \bar{x}_i)}{\hat{\beta}_1}.$$

Results from the logit model where used to generate the confidence intervals by the bootstrapping technique employed by Park, Loomis and Creel (1991). Mean WTP values and their respective confidence intervals are presented in Table 5. Confidence intervals are based on 4,000 bootstrapping repetitions drawn from a uniform distribution.

In the three cases, our estimates are statistically significant and different from zero, implying that in general consumers are very receptive toward country-of-origin labeling. The mean WTP estimate for the mandatory country-of-origin labeling program has been calculated as $431.37/ year. Although this estimate is fairly large, it represents the fact that many respondents were willing to pay for the program even when bids were as high as $200 and $250/year. The premium for "U.S. Certified Steak" was calculated as $1.90/lb over the original base price of $4.00/lb, while the premium for hamburger certified as "U.S. Certified Hamburger" was estimated as $1.33/lb over the $1.20/lb regular price. In percent terms, the premium for "U.S Certified Steak" is about 47 percent of the initial value, while for "U.S. Certified Hamburger" it is about 110 percent.

This higher premium in percentage terms for "U.S. Certified Hamburger" can be justified through two explanations: first, the hamburger when compared to steak is much cheaper, which helps to explain the fact that consumers would be more willing to pay higher premiums for a product which is not as highly priced initially; secondly, "hamburger eaters," as the results from the logit coefficients indicate, are in general more concerned about source verification issues, and as a consequence they are more willing to pay for country-of-origin labels.

Conclusions

In this paper we assess consumer willingness to pay for a mandatory country-of-origin labeling program, as well as for steak and hamburger labeled as "U.S. Certified Beef." We conducted a consumer survey in several grocery stores and in different locations in Colorado. Results indicate that consumers are in general very concerned about source verification issues, and as a consequence, they are willing to pay a high premium for the mandatory country-of-origin labeling program, as well as for individual products labeled as "U.S. Certified Beef."

In particular, our results suggest that females, who are the primary shoppers in their household, and who are concerned about food quality and food safety issues, are more likely to support mandatory country-of-origin. The cross product of education and income is not statistically significant and carries a negative sign for the three equations estimated. Although surprising at a first glance, more educated and wealthier consumers are less likely to support mandatory country-of-origin programs and labeled products. Thus, wealthier and more educated consumers do not place any additional value on country-of-origin labels. This finding may substantiate some of the initial concerns related to whether or not a country-of-origin labeling program may decrease the domestic beef market share and increase the corresponding share of other exporting countries such as New Zealand, Australia or Canada.

Future research may focus on comparing consumer perceptions toward different country-of-origin labels. It will be also interesting to find out whether these findings hold in a more diverse and larger population. Additionally, from a methodological standpoint, it will be worthy of note to distinguish the true concerned individuals from the "yea sayers" of the contingent valuation questions in order to obtain more reliable willingness-to-pay estimates.

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Table 1. Summary Statistics for the Demographic Variables

Variable Name	Description (Coding)	Mean	Standard Deviation.
Age	1= 18 to 21 2=22 to 24 3=25 to 29 4=30 to 34 5=35 to 39 6=40 to 44 7=45 to 49 8=50 to 54 9=55 to 59 10= 60+ years	5.983	2.781
Gender	1 if female, 0 if male	0.646	0.529
Shopper	1 if primary household shopper, 0 otherwise	0.893	0.309
Education	1 = Elementary, 2 = Some High School, 3 = HS Diploma, 4 = Some College, 5 = Junior College, 6= B.A. or B.S., 7= Graduate School	5.476	1.517
Children	1 if children <18 living in the household, 0 otherwise	0.399	0.499
Family Size	Number of family members living in the household	2.111	1.129
Income	2001 annual household income: 1 = <$20,000 2 = $20,000-$29,999 4 = $30, 000-$39,999 5 = $40, 000-$49,999 6= $50, 000- $59,999 7= $60, 000- $69,999 8= >=70,000	5.538	3.047
Race	1 if Caucasian, 0 otherwise	0.886	0.318

Table 2. Summary Statistics for Consumer Information and Perception Variables (Variables measured on a Likert Scale where 1=not at all desirable; 5=extremely desirable)

Attribute	Description	Mean	Std. Dev.
Local	Importance of the beef raised locally	2.352	1.296
Source Assurance	Importance of knowing who produced your beef	3.843	1.302
Brand	Importance of carrying a premium brand	3.538	1.264
Fresh	Importance of freshness	4.744	0.669
Lean	Importance of beef being lean	4.269	0.950
High Quality	Importance of beef products carrying a high quality grade	4.398	0.874
Tenderness Assurance	Importance of knowing that the meat is tender	3.986	1.111
Nutritional Value	Importance of carrying a label about the nutritional value of the beef product	1.930	1.067
Food Safety	Importance of beef being food safety inspected	4.610	0.842
Organic	Importance of the use of organic practices when raising beef	3.442	1.335
Visual Presentation	Importance of good visual presentation of beef	4.119	1.004

Table 3. Consumer Profile: Driving Forces of Shopping Decisions and Knowledge about the Origin of Beef

Characteristic	Description	Mean	Std. Dev.
Price	Consumers who consider price as the primary driving of their shopping decisions	0.226	0.419
Quality	Consumers who consider quality as the primary driving force of their shopping decisions	0.412	0.493
Health	Consumers who consider food safety and health related issues to be the driving force of their shopping decisions	0.251	0.434
Knowledge	Consumers who are knowledgeable about the origin of their beef	0.347	0.419

Table 4. Results: WTP equations for a) a mandatory labeling program for beef; b) "U.S. Certified Steak;" and c) "U.S. Certified Hamburger".

	Mandatory Labeling Program		"U.S. Certified Steak"		"U.S. Certified Hamburger"	
	a)Coefficients	a)T-values	b)Coefficients	b)T-values	c)Coefficients	c)T-values
Constant	-2.984**	-2.820	-4.094**	-3.715	2.516**	-2.415
Bid	-0.003**	-1.952	-0.422**	-2.014	-1.019	-1.406
Shopper	0.890*	1.785	1.475**	2.569	0.987**	1.975
Female	0.763**	2.280	0.277	0.352	0.711**	2.110
Kids	0.219	0.605	0.654**	2.022	0.358	1.033
Educa* Inc	-0.433	-1.197	-0.518	-1.548	-0.640*	-1.824
Quality	0.356*	1.807	0.461**	2.372	0.231	1.178
Food Safety	0.146**	2.401	0.148**	2.569	0.049	0.804
Source Assurance	0.182	1.424	0.072	0.603	0.338**	2.707
Log. Lik	-105.81		-121.58		-109.89	
Res. Log. Lik	-122.00		-139.99		-128.02	
% of Correct Predictions	75.24%		67.15%		73.89%	

Table 5. Willingness-to-Pay estimates and Confidence Intervals

Program	Mean WTP	C.I.
Mandatory Country-of-Origin Labeling Program	$431.57	($101.1, $603.7)
Premium for Steak labeled as "U.S. Certified Beef"	$1.90	($1.10, $2.45)
Premium for Hamburger Labeled as "U.S. Certified Beef"	$1.33	($0.98, $1.67)